

## Two New Species of *Paspalum* (Poaceae: Paniceae) from Brazil

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**ABSTRACT.** Two narrow endemics, *Paspalum campinarum* (group *Corcovadensia*) from Amazonas, Brazil, and *P. zuloagae* (group *Quadrifaria*) from Minas Gerais, Brazil, are described, illustrated, and compared with putatively related species. *Paspalum zuloagae* is easily distinguished from all members of the *Quadrifaria* group by its prominent sheath auricles, and *P. campinarum* is distinguished from South American species of the *Corcovadensia* group by its upper glume  $\frac{3}{5}$ – $\frac{4}{5}$  as long as the upper floret and the possession of axillary inflorescences.

While studying Poaceae collections from Brazil, some specimens of *Paspalum* L. were encountered that could not be assigned to any species in that genus and are described here as new. *Paspalum* is a largely American genus of approximately 330 species. As the largest grass genus in Brazil, many of its species are ecological dominants of savannas and grasslands. The monograph by Chase (1929) of North American species, and her unpublished work of the South American species [accessible from the Hitchcock and Chase Library in the Botany Department of the Smithsonian Institution], are essential references for studies in the genus. Chase proposed a largely informal infrageneric classification in these two works, and it has been extensively used by many contemporary agrostologists.

***Paspalum campinarum*** Filgueiras & Davidse, sp. nov. TYPE: Brazil. Amazonas: Transamazon Highway, 53 km W of Aripuanã River, "campina" region, common but not abundant in open campina of white sandy soil, 29 June 1979, C. E. Calderón, O. P. Monteiro & J. Guedes 2715 (holotype, INPA; isotypes, MO, US). Figure 1.

Ab omnibus speciebus austroamericanis *Corcovadensiae* inflorescentia terminali ac axillari, gluma superiore  $\frac{3}{5}$ – $\frac{4}{5}$  longitudinis spiculae differt.

Caespitose perennials; rhizomes short, knotty. Culms 40–75 cm long, erect to semi-decumbent at the base, branched just above the lowest nodes but

occasionally also with flowering branches from the middle or upper nodes, with 6–8 elongate internodes; basal internodes pilose, the upper ones glabrous; basal nodes pilose to glabrescent, the upper ones glabrous. Leaves cauline only; basal bladeless sheaths densely pilose, the upper ones glabrescent to glabrous, striate, one margin long ciliate, the other glabrous; auricles usually 2, 0.5–1.5 mm long, developed primarily on the upper sheaths; ligule 0.2–0.3 mm long, membranous, glabrous; blades 4–9.9 cm long, 9–19 mm wide, lanceolate, slightly cordate at the base, glabrous on both surfaces, strongly striate, especially on the adaxial surface, the margins scabrous, usually ciliate at the base and pubescent near the margins of the very short pseudopetiole with tuberculate, white hairs 2–5 mm long. Inflorescences 10.5–13 cm long when fully exerted, terminal and axillary, with 5–25 ascending racemes in terminal inflorescences, fewer in axillary inflorescences; common rachis 9–12 cm long, glabrous; racemes 1.5–6.5 cm long, terminating in a spikelet; raceme rachis 0.3–0.6 mm wide, triquetrous, with a few scattered, tuberculate, white hairs 4–8 mm long. Pedicels 0.5–1 mm long, of unequal length, paired, the apex discoidal. Spikelets 2.3–2.9 mm long, 1–1.2 mm wide, elliptical in outline, paired, pubescent, tan-brown; lower glume absent; upper glume  $\frac{3}{5}$ – $\frac{4}{5}$  as long as the spikelet, 3-nerved, the surface appressed pilose, the margins densely ciliate; lower floret sterile, consisting only of a lower lemma; lower lemma as long as the spikelet, 3-nerved, the surface glabrous, the margins ciliate; lower palea absent; upper floret bisexual, minutely longitudinally striate, pale, glabrous; upper lemma 5-nerved, glabrous, minutely longitudinally striate, the germination flap evident at the base; upper palea similar to the upper lemma in size and texture, 2-nerved, minutely longitudinally striate; lodicules 2, conduplicate; stamens 3, the anthers 2–2.2 mm long, tan to brownish; ovary 0.3–0.4 mm long; styles 2, separate; stigmas 2, plumose, tan. Caryopsis not found.

In the following differentiating characters—perennial life form, relatively broad leaf blades, pan-

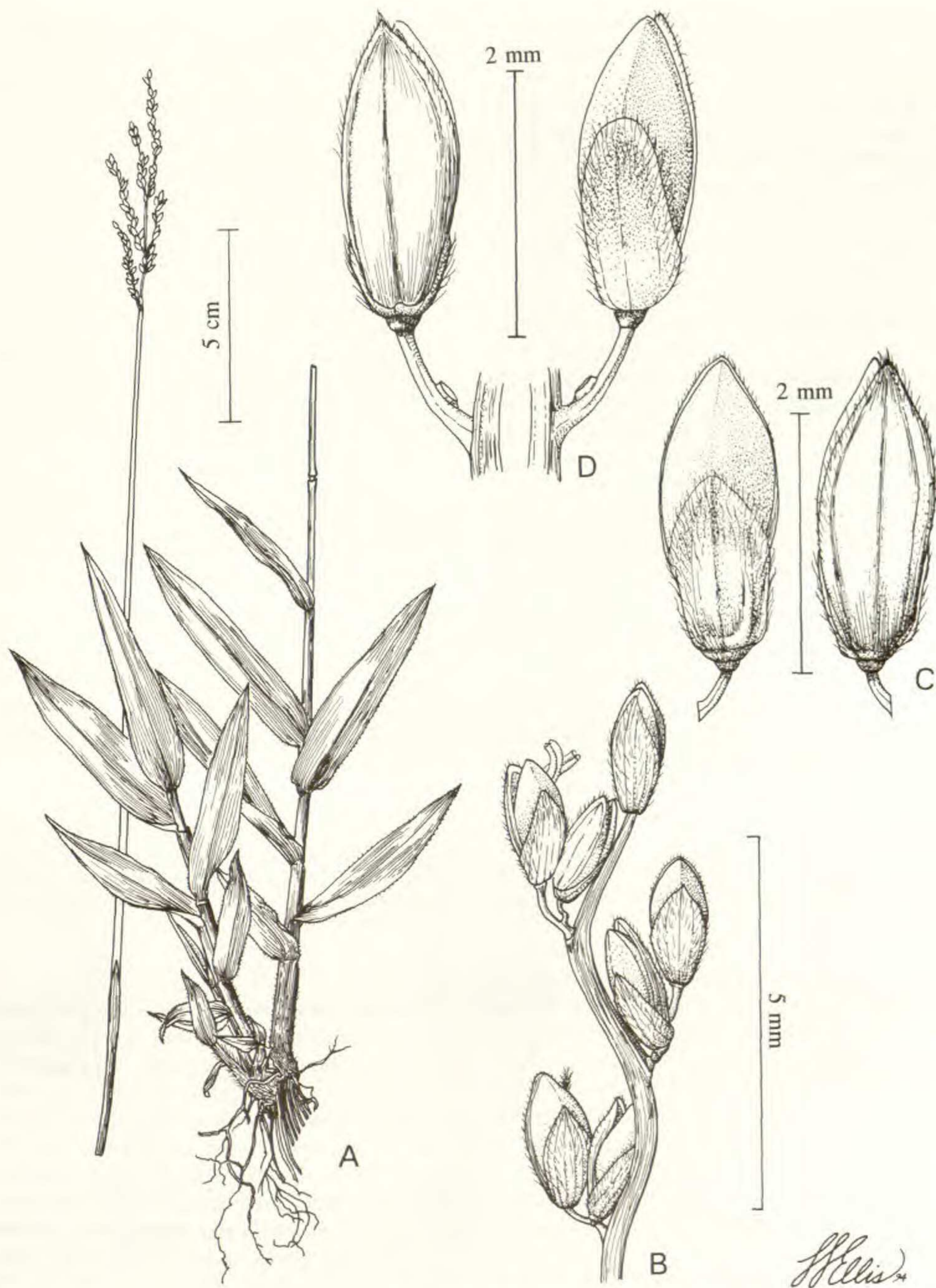


Figure 1. *Paspalum campinarum* Filgueiras & Davidse, illustrated from the type collection (Calderón et al 2715).  
—A. Habit. —B. Terminal portion of a raceme. —C. Dorsal (left) and ventral (right) views of a secondary spikelet.  
—D. Dorsal (left) and ventral (left) views of a primary spikelet.

icles with several to many racemes, a narrow rachis, paired, undifferentiated plano-convex spikelets, pale upper florets, and minutely longitudinally striate texture of the upper floret—*P. campinarum* agrees with those of group *Corcovadensia*, of which three other species occur in Brazil: *P. corcovadense* Raddi, *P. loefgrenii* Ekman, and *P. mandiocanum* Trinius. It is also worth noting that in both *P. corcovadense* and *P. mandiocanum* the upper glume is distinctly shorter than the spikelet, but not nearly as short as in *P. campinarum*. We, therefore, believe that its true affinity is with this species group.

We also compared *Paspalum campinarum* to *P. inaequivalve* Raddi because the latter is a perennial species with relatively short, broad leaf blades, terminal and axillary panicles with several to many racemes, a narrow rachis, paired, undifferentiated spikelets, pale upper florets, and, especially, a shortened upper glume that exposes the upper floret. Chase (unpublished) included two species in the group *Inaequivalvia*: *Paspalum inaequivalve* Raddi and *P. microstachyum* J. S. Presl. The latter is an annual with long-pedicellate, irregularly arranged spikelets with the upper glume as long as the lower lemma, and is clearly not closely related to *P. campinarum* or *P. inaequivalve*. *Paspalum inaequivalve* differs from *P. campinarum* in its weak, trailing to decumbent culms, glabrous, noncordate basal leaves, 3 to 15 racemes with glabrous rachis and, especially, a smooth, shining upper floret that is not minutely longitudinally striate.

It is perhaps unwise to differentiate species groups in *Paspalum* primarily on the basis of relative length of the upper glume, since reduction of the upper glume seems to have evolved repeatedly in obviously different groups of *Paspalum*, for example: *P. inaequivalve* (group *Inaequivalvia*), *P. usteri* Hackel [sect. *Anachrysis* (Nees) Pilger], *P. marmoratum* Kuhlmann (group *Plicatula*), *P. delicatum* Swallen (group *Parviflora*), and *P. decumbens* Swartz (group *Decumbentes*). Reduction has been carried to the extreme in species without any upper glume, as in: *P. gardnerianum* Nees (sect. *Eremachyrion* Doell, group *Gardneriana*), *P. nudatum* Luces (group *Parviflora*), and *P. pulchellum* Kunth (group *Reimaria*).

*Paspalum campinarum* is known only from a single collection from the white sandy "campina" in the Brazilian Amazonia, where it was found to be "common but not abundant." The specific epithet alludes to this campinas habitat. It is notable that this is the same locality in which a highly distinctive grass genus, *Arundoclaytonia* Davidse & Ellis, was discovered at the same time (Davidse & Ellis, 1987). We assume that like *A. dissimilis* Davidse & Ellis,

*Paspalum campinarum* is probably restricted to the white-sand soils of Amazonian campinas.

The four Brazilian species of the *Corcovadensia* group may be distinguished as follows:

- 1a. Panicle rachis 15–25 cm long; spikelets 2.5–2.9 mm long; upper glume as long as the spikelet; lower glume frequently present . . . *P. loefgrenii*
- 1b. Panicle rachis usually less than 15 cm long; spikelets 1.8–2.5 mm long; upper glume shorter than the upper floret; lower glume always absent.
  - 2a. Upper glume  $\frac{1}{10}$ – $\frac{8}{10}$  as long as the upper floret . . . . . *P. campinarum*
  - 2b. Upper glume  $\frac{1}{10}$  as long as the upper floret.
    - 3a. Spikelets 1.4–1.5 mm wide, elliptic-oblongate; racemes relatively thick; culms frequently decumbent at the base and rooting at the lower nodes . . . . . *P. mandiocanum*
    - 3b. Spikelets 0.9–1.0 mm wide, broadly elliptical; racemes relatively slender; culms generally erect and not rooting at the lower nodes . . . . . *P. corcovadense*

***Paspalum zuloagae*** Davidse & Filgueiras, sp. nov. TYPE: Brazil. Minas Gerais: Serra da Gramma, summit, mossy rock, 19–25 Apr. 1925, *A. Chase* 9578 (holotype, US; isotype, MO). Figure 2.

Ab omnibus speciebus *Quadrifariae* auriculis conspicuis, 5–13 cm longis (auriculae ligulae saepe connatae) differt. *Paspalo coryphaeo* Trinius simile sed rhizomatibus nullis, laminis 5–17 cm longis, basin versus attenuatis, inflorescentia 8–17 cm longa, 12–27 racemis differt.

Perennial, caespitose; rhizomes weakly developed or absent. Culms 65–90 cm long, erect, frequently branched at the base, sometimes with aggregate branches from the middle nodes; nodes glabrous; internodes glabrous. Leaves mostly basal, but old culms without basal leaves; basal leaves with imbricate sheaths; sheaths strongly striate, glabrous on the back, often purplish, the margins long-ciliate; auricles 2, 5–13 mm long, conspicuous, glabrous to sparsely long-pilose; ligule 4–11 cm long, membranous, mostly adnate with the auricles, but distinguishable by its membranous texture; ligular area glabrous, rarely with a few yellowish hairs 1–2 mm long; blades 5–17 cm long, 6–12 mm wide, linear-lanceolate, attenuate at the base, acuminate at the apex, glaucous, glabrous on both surfaces or with a few scattered, whitish hairs on the adaxial surface, the margins prominently ciliate with tuberculate-based, whitish or slightly yellowish hairs 3–5 mm

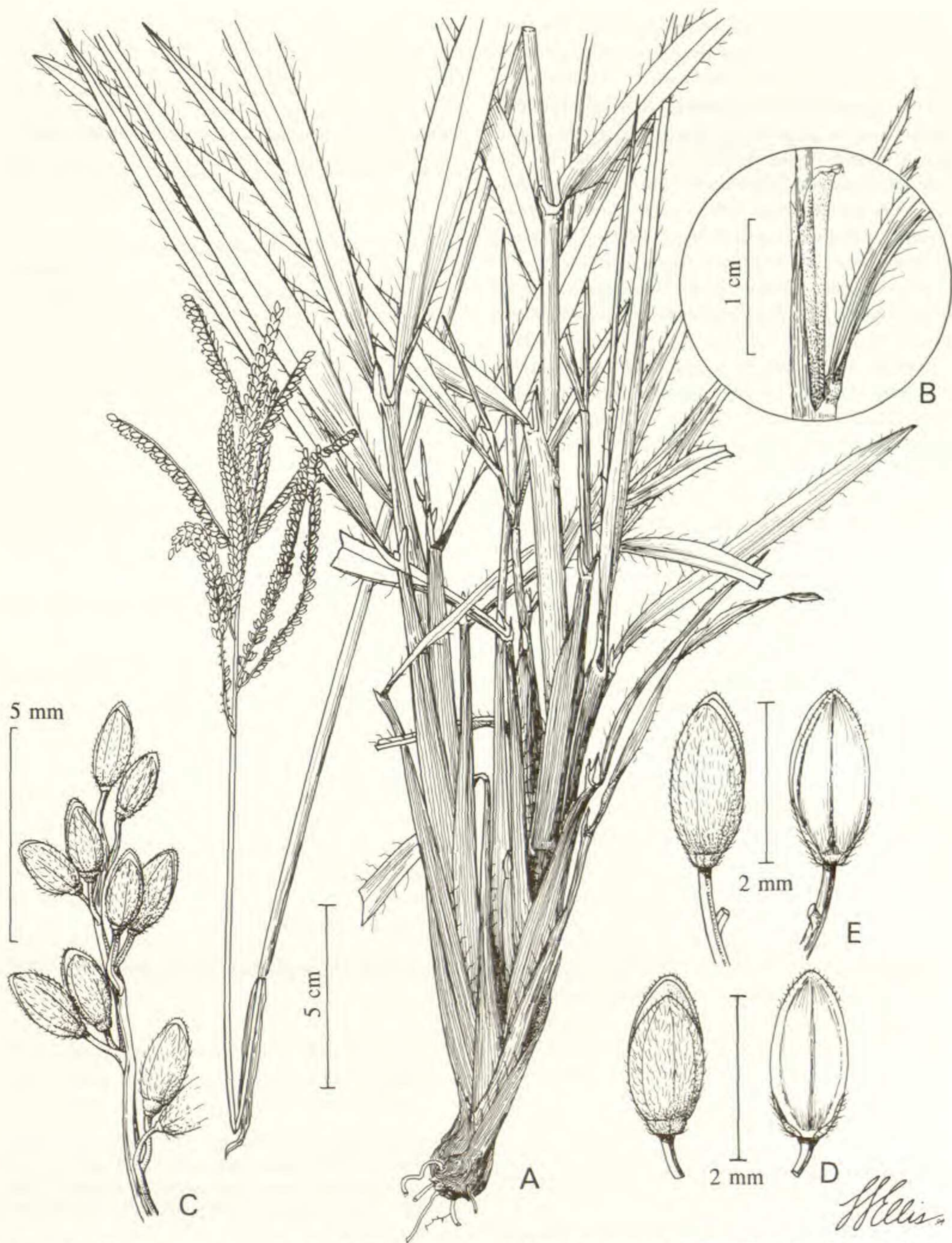


Figure 2. *Paspalum zuloagae* Davidse & Filgueiras, illustrated from the type collection (Chase 9578). —A. Habit. —B. Ligular area of a leaf. —C. Portion of a raceme with paired spikelets. —D. Dorsal (left) and ventral (right) views of secondary spikelet. —E. Dorsal (left) and ventral (right) views of a primary spikelet.

long, the cilia less frequent in the uppermost leaves; epidermal cells visible on the abaxial surface of blades, especially on the older leaves. Inflorescence 8–17 cm long, terminal, with 12–27 ascending ra-

cemes; common rachis 6.5–14 cm long, glabrous; racemes 2–12 cm long, with a tuft of whitish or slightly yellowish hairs at the base, decreasing in size toward the apex, terminating in a spikelet; ra-

ceme rachis ca. 0.2 mm wide, glabrous. Pedicels 0.3–1 mm long, of unequal length, paired, glabrous, waxy, the apex discoidal. Spikelets 2–2.5 mm long, 0.8–1 mm wide, narrowly elliptic in outline, paired, glabrescent to puberulent, tan to yellowish; lower glume absent; upper glume  $\frac{2}{3}$ – $\frac{3}{3}$  as long as the spikelet, 3-nerved, glabrescent to puberulent; lower floret sterile, consisting only of a lower lemma; lower lemma as long as the spikelet, 3-nerved, glabrous to puberulent; lower palea absent; upper floret bisexual, smooth, pale, glabrous; upper lemma 5-nerved, glabrous, longitudinally striate; upper palea similar to the upper lemma in texture and color, 2-nerved, longitudinally striate; lodicules 2, conduplicate; stamens 3, the anthers 1–1.5 mm long, deep purple; ovary 0.4–0.5 mm long; styles 2, separate; stigmas 2, plumose, purplish. Caryopsis not found.

This new species belongs to the informal *Quadrifaria* group of Chase by virtue of its perennial life form, terminal panicles with numerous racemes, narrow raceme rachis, small, paired, undifferentiated, tan to green, elliptical spikelets, and pale upper floret. *Paspalum zuloagae* is distinguishable from all the other species of group *Quadrifaria* by the presence of two conspicuous auricles on either side of the sheath apex. The auricles are mostly herbaceous in texture with well-developed veins that are continuous with those of the sheath. This grades into a membranous apex near the tip of the auricle. In fully developed leaves from the middle nodes of the culms, the auricles are almost completely adnate with the equally long membranous ligule. In basal leaves and leaves from the upper nodes, the auricle may be considerably larger than the ligule and the upper half of the auricle is therefore free. Both auricles and ligule are typically greatly reduced in the flag leaf. The delicate connection between the ligule and auricle is readily torn so that the ligule and auricles often seem superficially separate in older leaves.

The spikelets are slightly dimorphic in that the upper glume is shorter in the secondary or short-pedicellate spikelets compared to those of the primary or long-pedicellate spikelets.

The specific epithet honors Fernando O. Zuloaga, prominent Argentinean agrostologist, long-time friend, and valued collaborator of both authors. The collections Chase 9562 and 9578 were cited in the index to Chase's unpublished South American manuscript as the basis for the establishment of a new species, "*Paspalum auritum* C., ined." However, no description was provided and no annotation on the labels was made.

*Paratypes*. BRAZIL. Minas Gerais: Serra da Gramma, open summit, 19–25 Apr. 1925, *A. Chase* 9562 (MO, US 2 sheets); Serra do Espinhaço, ca. 20 km E of Diamantina, elev. 900 m, cerrado, culms to ca. 1.5 m tall, 22 Mar. 1970, *H. S. Irwin, S. F. da Fonseca, R. Souza, R. Reis dos Santos & J. Ramos* 28072 (UB).

The following key is provided to distinguish all the species that we include in group *Quadrifaria*:

- 1a. Leaf sheaths with 2 conspicuous auricles 5–13 mm long ..... *P. zuloagae*
- 1b. Leaf sheaths without auricles or, if present, inconspicuous and 2 mm long or less.
  - 2a. Raceme rachis with ciliate hairs 1–3 mm long; cauline leaf blades with the basal  $\frac{1}{4}$ – $\frac{1}{2}$  strongly narrowed, folded, and pseudopetiolate.
    - 3a. Leaf blades 4–8 mm wide ..... *P. quadrifarium*
    - 3b. Leaf blades 12–15 mm wide ..... *P. brunneum*
  - 2b. Raceme rachis glabrous or scaberulous, long hairs restricted to the base and axils of the racemes, rarely the rachis shortly pubescent; cauline leaf blades rounded to narrowed but not pseudopetiolate.
    - 4a. Basal nodes, internodes, and leaf sheaths densely villous; sheaths strongly keeled; spikelets glabrous ..... *P. dasytrichium*
    - 4b. Basal nodes, internodes, and leaf sheaths glabrous to pilose, but never densely villous; sheaths slightly keeled to weakly rounded; spikelets pubescent ..... *P. coryphaeum*

*Paspalum brunneum* Mez, Repert. Spec. Nov. Regni Veg. 15: 74. 1917. TYPE: Brazil. Guanabara: *Glaziou* 9050 (lectotype, designated by Smith et al. (1982), US).

*Distribution*: Argentina, Brazil, Paraguay, Uruguay.

*Paspalum coryphaeum* Trinius, Gram. Panic. 114. 1826. TYPE: Brazil. In humidis prope Ytu, *Langsdorff* s.n. (holotype, LE not seen).

*Paspalum chapadense* Swallen, Phytologia 14: 363. 1967. TYPE: Brazil. Maranhão: collected in chapada between Caxias and Barro do Corda, 18–26 Feb. 1934, *Swallen* 3508 (holotype, US; isotype, K not seen).

*Paspalum familiare* Steudel, Syn. Pl. Glumac. 1: 24. 1853. TYPE: Venezuela. Sucre: *Funck & Schlim* 228 (holotype, P?, fragments, US).

*Paspalum indutum* Lucas, J. Wash. Acad. Sci. 32: 162, f. 6. 1942. Syn. nov. TYPE: Venezuela. Mérida: Pozo Hondo, near Egido, 960 m, Apr. 1940, *Sergent* 37 (holotype, VEN, fragments, MO, US).

*Paspalum pruinatum* Trinius, Sp. Gram. 3: t. 272. 1836. TYPE: Brazil. Pr. Cachoeira, *Anon.* s.n. (LE not seen).

*Paspalum violascens* Mez, Repert. Spec. Nov. Regni Veg. 15: 73. 1917. TYPE: Trinidad: in loco accuratione haud indicata, *Broadway 2175* (holotype, B?, fragment, US; isotype, US).

*Distribution:* Argentina, Belize, Brazil, Colombia, Costa Rica, Guianas, Honduras, Mexico, Panama, Trinidad, Venezuela.

*Paspalum dasytrichium* Dusén ex Swallen, Phytologia 14: 363. 1967. TYPE: Brazil. Paraná: Villa Velha, collected among rocks, 21 Oct. 1914, *Dusén 15700* (holotype, US).

*Paspalum dasytrichium* var. *dasytrichium*.

*Paspalum dasytrichium* var. *glabrum* Lyman B. Smith & D. C. Wasshausen, Bradea 2: 247. 1978. TYPE: Brazil. Santa Catarina: Mun. Lajes, moist ground in shade, woods borders, Coxilha Rica, 6 Jan. 1946, *Swallen 8173* (holotype, US).

*Distribution:* Brazil (Paraná, Santa Catarina, São Paulo).

*Paspalum quadrifarium* Lamarck, Tabl. Encycl. 1: 176. 1791. TYPE: Argentina. Buenos Aires, *Commerson s.n.* (lectotype, designated by Parodi (1937), P not seen).

*Paspalum ferrugineum* Trinius, Sp. Gram. 2: 136. 1829. TYPE: Chile, *Lindley s.n.* (syntype, LE not seen). Uruguay, *Otto s.n.* (syntype, fragment, US).

*Paspalum quadrifarium* var. *ferrugineum* (Trinius) Herter, Anales Mus. Hist. Nat. Montevideo, ser. 2, 3: 55. 1929.

*Distribution:* Argentina, Brazil, Paraguay, Uruguay.

*Paspalum zuloagae* Davidse & Filgueiras.

*Distribution:* Brazil (Minas Gerais).

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